(54) Title: DATA INPUT ARRANGEMENT

(57) Abstract: This invention relates to an arrangement for inputting graphical information into a computer system, where the graphical information arises when a drawing device is moved relative to a base. The base is provided with a position-coding pattern and the drawing device is arranged to detect positions on the base by means of the position-coding pattern. The computer system is arranged to record position information from the drawing device indicating positions within a first area on the base as graphical inputs and position information indicating positions within a second area on the base as information concerning a visual property associated with the graphical input.

WO 01/71473 A1

DATA INPUT ARRANGEMENT

Field of the Invention
        The present invention concerns an arrangement for
inputting graphical information into a computer system,
and a base suitable for incorporation in such an
5   arrangement. In addition it concerns a drawing device and
a storage medium for digital information.

Technical Background
        Systems for inputting graphical information into
10   computer systems are used to a great extent together
with various types of graphics programs, CAD programs,
web design programs, etc. In such a context the input
system makes possible the input of hand-drawn figures
into the program.
15   Input systems of this type often consist of a base
and a drawing device. When the drawing device is moved
over the base its movement is recorded in the system
electronically as a graphical input, which can be trans-
mitted to a computer system in digital form. An example
20   of such an input system is described in US, 4,717,793, A.
In this a base is arranged to detect inductively the po-
sition of a drawing device on the base. By repeated re-
cording of this information, the movement of the drawing
device across the base results in a graphical input.
25   Known input systems are often expensive. In addition they
are usually unwieldy, particularly if the base is re-
quired to have a large input surface and if it is to
be possible to input visual properties of graphic inputs.
This makes the use of such input systems more difficult,
30   particularly in mobile applications.

Summary of the Invention
        This invention aims to solve the above-mentioned
problems either completely or partly.

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This aim is achieved by an arrangement for inputting graphical information into a computer system in accordance with claim 1, a base suitable for use in such an arrangement in accordance with claim 5, a drawing device

5   in accordance with claim 17 , a storage medium for digital information in accordance with claim 19 and a base according to claim 20.

According to a first aspect of the invention an arrangement is provided for inputting graphical information

10   into a computer system, the graphical information arising when a drawing device is moved relative to a base. The arrangement is characterised in that the base is provided with a position-coding pattern and in that the drawing device is arranged to detect positions on the base by

15   means of the position-coding pattern. In addition the computer system is arranged to record position information from the drawing device indicating positions within a first area on the base as graphical inputs. Position information from the drawing device indicating positions

20   within a second area on the base is recorded as information concerning a visual property associated with a graphical input.

Such a position-coding pattern can be designed in the way described in the Applicant's patent applications

25   WO 00/73983 and PCT/SE00/01667, which are hereby incorporated by reference. Moreover, reference is made to WO/01/16691, the content of which is included in the present specification by reference. Such a drawing device has a number of applications in addition to the input of

30   graphical information into graphics programs, etc. A user who has such a drawing device for other applications can therefore realise an arrangement in accordance with the invention just by the use of a suitable position-coded base, for example a sheet of paper, and suitable

35   software, for example in a personal computer. Both the software and the base are relatively cheap to produce, for which reason an arrangement in accordance with the

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invention can be achieved at low cost. The arrangement
also permits the carrying out of graphical inputs with
various visual properties, which can be selected.

In addition an arrangement in accordance with the
5 invention is suitable for mobile applications, even if
the base is made large. If the base is constructed as
a sheet of paper it can simply be folded up.

In accordance with a preferred embodiment the com-
puter system is integrated in the drawing device. This
10 makes possible even greater mobility. A graphical image
can thus be produced in the drawing device and, for exam-
ple, later transmitted via a mobile telephone system to
a server, without having a personal computer on site.
Alternatively, the computer system may be integrated in a
15 cellular telephone.

Preferably, the computer system may be devised to
display an indication of the latest selected visual
property. This allows for acknowledging the user as
regards the selected visual property.

20 According to a second aspect of the invention a base
is provided for the input of graphical information into a
computer system, the graphical information arising when a
drawing device is moved relative to the base. The base is
provided with a position-coding pattern, which makes it
.25 possible to detect positions on the base using the draw-
ing device, which is arranged to transmit position infor-
mation to the computer system. The base has a first and
a second area. Positions within the first area are
intended to be detected by the computer system as graphi-
30 cal inputs and positions within the second area as in-
formation concerning a visual property associated with a
graphical input. A sub-area within the second area, where
positions within the sub-area are intended to be detected
by the base as information concerning a visual property,
35 is provided with a visible, visual indicator representing
this information. This makes the use of an arrangement
such as that described above, considerably easier.

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The first and the second area on the base are pre-
ferably separated from each other in a visible way, which
makes it easier for a user to work with an arrangement
according to the invention.

5   The information concerning visual properties can
preferably consist of colour information, which enables
more expressive graphical inputs to be carried out, as
several colours can be used.

        According to another embodiment the information con-
10   cerning visual properties can consist of line type infor-
mation, which enables more expressive graphical inputs to
be carried out, as several types of line can be used, for
example solid, dotted and broken.

        According to a further embodiment the information
15   concerning visual properties can consist of line width
information, which enables more expressive graphical in-
puts to be carried out, as several line widths can be
used.

        When the second area is used for colour information,
20   a sub-area within the second area, where a position
within the sub-area is intended to indicate a particular
colour, can preferably be coloured with this colour. This
results in a user interface, which is independent of
language.

25   According to another embodiment a sub-area within
the above-mentioned second area, where a position with-
in the sub-area is intended to indicate a particular
colour, can be provided with an alphanumeric indicator
signifying this colour. This makes it possible for a user
30   with limited colour vision to be able, in spite of this,
to carry out graphical inputs with colour properties as
required.

        According to yet another embodiment the second area
can comprise a set of visually separated sub-areas, each
35   provided with at least one alphanumeric symbol. This
makes possible the input of properties from a great
number of visual properties even though only a small

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second area is provided. This is because a combination of
sub-area indications can be made arbitrarily long.

According to a third aspect of the invention a draw-
ing device is provided for inputting graphical informa-
5   tion into a computer system, where the graphical informa-
tion arises when the drawing device is moved relative to
a base. The drawing device is arranged to detect posi-
tions on the base by the utilisation of a position-coding
pattern marked on the base. A computer system integrated
10   in the drawing device is arranged to detect positions
within a first area on the base as graphical inputs and
positions within a second area on the base as information
concerning visual properties associated with a graphical
input. The advantages of such a drawing device are shown
15   in the discussion above. The drawing device can also be
varied in a number of ways corresponding to the base
described above.

According to a fourth aspect of the invention a
storage medium for digital information is provided, which
20   can be read by a computer system, the storage medium con-
taining a program for inputting graphical information
into a computer system where the program defines the fol-
lowing steps: recording of position information from a
drawing device indicating positions within a first area
25   on a base as graphical inputs; and recording of position
information from a drawing device indicating positions
within a second area on the base as information con-
cerning visual properties associated with a graphical in-
put. Such a program makes possible the function of an ar-
30   rangement of the type described above. The program can
also be varied in a number of ways corresponding to the
base described above.

Brief Description of the Drawings
35   Fig. 1 shows an arrangement for inputting graphical
information in accordance with the invention.

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Fig. 2 shows an alternative embodiment of a base in-
tended to be used in such an arrangement.

Fig. 3 shows a further embodiment of such a base.

Fig. 4 shows diagrammatically the steps in a compu-
5   ter program suitable for use in an arrangement in accor-
dance with the invention.

Description of Preferred Embodiments

Fig. 1 shows an arrangement for inputting graphi-
10   cal information in accordance with the invention. The ar-
rangement comprises a drawing device 1, which is moved
over a base 3. In the embodiment shown a trace 5, prefer-
ably of ink, is deposited on the base 3. This is not,
however, necessary. The base can be made of an easily
15   erasable material, which means that the base 3 can be
used many times. A position-coding pattern 7 (shown en-
larged) is printed on the base.

The position-coding pattern 7 is so designed that
if part of the pattern with a certain minimum size is re-
20   corded, then this part of the pattern's position in the
pattern and thereby on the base can be determined unam-
biguously.

The positioning coding pattern 7 can advantageous-
ly be of such a type as shown in the Applicant's above-
25   mentioned Applications WO 00/73983 and PCT/SE00/01667
where each position is coded by a number of symbols and
where a symbol is used to code a number of positions. The
position-coding pattern 7 shown is constructed as shown
in WO 00/73983, where a large dot represents a "one" and
30   a small dot represents a "zero". It is, however, also
possible to design the position-coding pattern 7 as de-
scribed in PCT/SE00/01667, where different displacements
of a dot in relation to a raster point code different
symbol values.

35   The drawing device 1 is arranged to detect positions
on the base 3 utilising the position-coding pattern 7.
When the drawing device 1 is moved relative to the base 3

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and in contact with this, the drawing device records a
series of positions on the base 3, which series is trans-
mitted to a computer system 9, in this case a personal
computer. The computer system may also be integrated in a

5   cellular telephone. The transmission of the position
information can be carried out by means of various types
of cables or by means of an infrared link. However, a
short-range radio link is preferably used, for example in
accordance with the BLUETOOTH standard. The position

10   information can be transmitted as a set of pairs of co-
ordinates, but preferably the drawing device 1 first
converts the series of pairs of co-ordinates into a
polygon train which is then transmitted. It is recognised
that the transmission can be carried out in several

15   steps. For example, an input can be carried out with the
drawing device and base and then the position information
is transmitted to a personal computer. This information
can then be transmitted over a network to a server, in
which interpretation of the graphical inputs is carried

20   out.

       The drawing device 1 may be provided with means for
allotting a detected position a time-stamp. This enables
the order of graphical inputs to be preserved.The base 3
comprises a first area 11 corresponding to a first number

25   of pairs of co-ordinates, and a second area 13,
corresponding to a second number of pairs of co-
ordinates. The first area 11 and the second area 13 on
the base 3 are visually separated, in this case by means
of a printed line 15.

30   The computer system 9 is arranged, using suitable
software, to record position information from the drawing
device, for example in the form of a polygon train, with-
in the first area 11 as a graphical input. In the example
shown, a trace 5 is deposited as mentioned when the

35   drawing device 1 is moved over the base 3 in contact
with this. As this movement takes place within the first
area 11, the computer system 9 records the position in-

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formation which then arises and which is transmitted as a
graphical input 17. The graphical input 17 is thus gra-
phical digital information, which corresponds to a copy
of the trace 5. This graphical input 17 can, for example,

5   be reproduced on the screen 19 of the computer system 9.
When a position within the first area is recorded, a
corresponding pixel in an image in an application is set
accordingly to "one". A graphical input thus means that
at least one image pixel, stored or displayed, changes

10   state. A number of graphical inputs can make up an image
which, for example, can be sent with an e-mail.

When the drawing device detects a position, this
position is allotted a time-stamp, which corresponds to
the time of detection. This timing information may be

15   saved and used by the system in order to reproduce, not
only a completed drawing, but also the manner in which
the drawing was formed.

The computer system 9 is also arranged to record po-
sition information from the drawing device 1 within the

20   second area 13 as information concerning a visual pro-
perty associated with a graphical input. For example, as
already shown, after having created and recorded a gra-
phical input 17, the user can point with the drawing de-
vice 1 at a particular sub-area 21 in the second area 13

25   and thereby assign to the graphical input 17 a property
(for example the colour blue) associated with this
sub-area 21. This can also be done before the graphical
input 17 is carried out, depending upon how the software
in the computer system 9 is set. A sub-area 21 within the

30   second area 13, where a position within the sub-area 21
is intended to indicate a particular visual property, is
suitably provided with a visible, visual indicator 22
representing this property.

The computer system can also be integrated into the

35   drawing device. In this way a complete graphic image can
be produced in the drawing device and then, for example,
transmitted by means of a mobile telephone system to a

server or the like. The drawing device 1 can also be in-
tegrated into, for example, a mobile telephone. It is
also possible to let a computer system in the drawing de-
vice identify which positions are to be interpreted as
5   graphical inputs and which are to be interpreted as vis-
ual properties. The information corresponding to graphi-
cal inputs with particular properties can then be trans-
mitted to another computer system, for example a personal
computer.

10   Fig. 2 shows an alternative embodiment of a base 3'
intended to be part of an arrangement according to the
invention. Also here the base 3' comprises a first area
11' and a second area 13'. In this embodiment these are
produced as physically separate units. As in the pre-
15 viously shown embodiment, the first area 11' is used
to create graphical inputs and to accept a corresponding
trace 5'. The second area 13' is used to assign visual
properties to the graphical inputs.

When a visual property is chosen, this property may
20 preferably be fed back to the user in some way in order
to acknowledge the choice of visual property. If, for
instance, the drawing device communicates with a personal
computer and the user chooses the visual property blue,
the legend "blue" may be displayed on the monitor of the
25 personal computer. If the drawing device communicates
with a cellular telephone, a display on this telephone
may be used in the same way. Alternatively, a display
could be provided on the drawing device itself in order
to achieve this functionality.

30   Fig. 3 shows a further embodiment of a base 3" ac-
cording to the invention. The base may generally consist
of a paper sheet, which is an inexpensive solution. It
may also be made of a synthetic material such as polymer,
which could allow ink-text and -figures on the surface to
35 be easily erased. The base, as mentioned, is provided
with a position-coding pattern. Also here the base 3"
comprises a first area 11" and a second area 13". As in

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the previously shown embodiment the first area 11" is
used to create graphical inputs and to accept a corre-
sponding trace 5". The second area 13" is used to assign
visual properties to the graphical inputs. The second
5   area 13" has here a number of divisions 23, 25, 27, 29,
31, 33, each containing a number of sub-areas 21". Each
sub-area 21" comprises a set of positions. When a
computer system in the arrangement detects any of the
positions within this set, this is recorded as infor-
10   mation concerning a visual property corresponding to this
sub-area 21". The position codes in the sub-area 21" do
not normally occur within other sub-areas in the base 3".

The information concerning a visual property can be
colour information. The base 3" has here a first division
15   23 and a third division 27 in the second area 13" which
are used for recording colour information. The sub-areas
within the first division 23 are printed with alphanume-
ric indicators 22" signifying the colours represented by
the sub-areas. In this case these consist of the names of
20   the colours, but, for example, colour codes could also be
used. The sub-areas in the third division 27 have been
coloured with the colours (shown here by different
shading) they represent, which provides a user interface,
which is independent of language. The second division 25
25   is used in a similar way to represent line thickness in-
formation and the fourth division 29 is used to represent
line type information. In fig 3, there is shown 16
separate sub-areas, each having a numeral 0 to 9 and
letters A to F attributed to each sub-area. When the
30   drawing device points at one such area a numeral or
letter corresponding to this sub-area may be inserted in
the message. In this way, character recognition can be
avoided. There may be further sub-areas, for example
corresponding to all commonly used letters A to Z and a
35   to z to enable insertion of normal characters. This may
be used for specifying for instance an e-mail address, a
fax number or a keyword. These sub-areas may thus be used

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to achieve non-graphical inputs as well as applying
properties to graphical inputs. In this way virtually any
type of simulated keyboard with for instance ASCII-
characters may be achieved.

5   A fifth division 31 in the second sub-area 13″
comprises visually separated sub-areas, each provided
with at least one alphanumeric character. By pointing
at a sequence of these characters the user can input
an arbitrarily long code, corresponding to a particular
10   visual property. In this way a small surface can be pro-
vided with means for reliable indication of a large num-
ber of properties.

A sixth division 33 is used for specifying in which
layer a graphical input is to be deposited in for example
15   a drawing. Applying graphical inputs on different layers
may be useful in many applications. For instance, a
machine drawing may be completed in a first layer and
legends explaining features of the machine may be placed
in a second layer. Then it is optional whether the
20   explanations should be displayed or not. Different
recipients may also be emailed with different sets of
layers.

It is also possible to interrelate different sub-
areas in the second area. Thus, for instance, a specific
25   layer may be assigned specific properties, such as a
specific line width and a specific line colour.

Graphical inputs may be assigned other types of
visual properties. A graphical input may be assigned a
"text"-property, which makes the system apply OCR
30   (Optical Character Recognition) functionalities on the
input. A recorded legend may be given a visual property
such as "bold" or "italic" by using a corresponding
subarea.

The same concept applies to geometrical forms such
35   as circles and rectangles. A coarse circle form inputted
by the user may then, for instance, be perfected by the
system, by applying a "circle" subarea. Alternatively the

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user may specify a centre and radius for a circle in the
first area and mark a "circle" subarea in the second
area. Similarly, logos and other figures may be drawn.

Other subarea-functions may be "erase" (delete
5   objects in an area), "clear" (delete all objects) and
"undo" (delete the latest inputted object).

Fig. 4 shows diagrammatically the steps in a compu-
ter program suitable for incorporation in an arrangement
according to the invention where a base has two areas.
10 The program, which can be stored on any digital storage
medium (for example a diskette), defines steps as fol-
lows. After the identification 41 of a position, which
is preferably carried out in the drawing device, it is
determined 43 whether the position lies within the first
15 area. If such is the case, there is a first recording 45
of the position information as a graphical input. This
first recording comprises a number of subroutines (not
shown). Otherwise the position lies within the second
area, so that a second recording 47 of the position in-
20 formation takes place as information concerning visual
properties of a graphical input. The second recording
also comprises a number of sub-routines (not shown).

The scope of the patent protection applied for is
not restricted to the embodiments described above. The
25 invention can be varied and changed in a number of ways
within the scope of the following claims.

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CLAIMS

1. An arrangement comprising a base (3), a drawing
device (1) and software in a computer system (9), for in-
5   putting graphical information into the computer system
(9), the graphical information arising when the drawing
device (1) is moved relative to the base (3),
c h a r a c t e r i s e d   in that the base (3) is
provided with a position-coding pattern (7) and in that
10 the drawing device (1) is arranged to detect positions on
the base (3) by means of said position-coding pattern (7)
for the transmission of position information to the
computer system (9), the computer system (9) being
arranged using said software to record position
15 information from said drawing device (1) indicating
positions within a first area (11) on said base (3) as
graphical inputs, and to record position information from
said drawing device (1) indicating positions within a
second area (13) on said base (3) as information
20 concerning visual properties associated with a graphical
input.

2. The arrangement for inputting graphical informa-
tion according to claim 1, c h a r a c t e r i s e d   in
that said computer system is integrated in said drawing
25 device.

3. The arrangement for inputting graphical informa-
tion according to claim 1, c h a r a c t e r i s e d   in
that said computer system is integrated in a cellular
telephone.

30   4. The arrangement for inputting graphical informa-
tion according to any of the preceding claims,
c h a r a c t e r i s e d   in that the computer system is
devised to display an indication of the latest selected
visual property.

35   5. A base for inputting graphical information into
a computer system, the graphical information arising when
a drawing device is moved relative to the base,

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c h a r a c t e r i s e d in that the base (3) is provided
with a position-coding pattern (7) which makes it possi-
ble to detect positions on the base (3) using the drawing
device, which is arranged to transmit position informa-

5   tion to the computer system; in that the base (3) has a
first area (11) and a second area (13), positions within
the first area (11) being intended to be detected by the
computer system as graphical inputs and positions within
the second area (13) being intended to be detected by the

10   computer system as information concerning visual
properties associated with a graphical input; and in that
a sub-area (21) within said second area (13), where
positions within the sub-area (21) are intended to be
detected by the computer system as information concerning

15   a visual property, is provided with a visual indicator
(22) representing this information.

6. The base according to claim 5,
c h a r a c t e r i s e d in that said second area is
separated in a visible way from said first area.

20   7. The base according to claim 6,
c h a r a c t e r i s e d in that said second area is
physically separated from said first area (Fig. 2).

8. The base according to claim 5,
c h a r a c t e r i s e d in that said information

25   concerning visual properties consists of colour
information.

9. The base according to claim 5,
c h a r a c t e r i s e d in that said information
concerning visual properties consists of line type

30   information.

10. The base according to claim 5,
c h a r a c t e r i s e d in that said information
concerning visual properties consists of line thickness
information.

35   11. The base according to claim 8,
c h a r a c t e r i s e d in that a sub-area within said
second area, where a position within the sub-area is

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intended to indicate a particular colour, is coloured
with that colour.

12. The base according to claim 8,
c h a r a c t e r i s e d   in that a sub-area (21", Fig.
5   3) within said second area (13", Fig. 3), where a
position within the sub-area (21", Fig. 3) is intended to
indicate a particular colour, is provided with an
alphanumeric indicator (22", Fig. 3) signifying this
colour.

10   13. The base according to claim 12,
c h a r a c t e r i s e d   in that said alphanumeric
indicator consists of the name of the colour.

14. The base according to claim 12,
c h a r a c t e r i s e d   in that said alphanumeric
15   indicator consists of the colour's colour code.

15. The base according to claim 6,
c h a r a c t e r i s e d   in that said second area
comprises a set of visually separated sub-areas, each
provided with at least one alphanumeric symbol.

20   16. The base according to claim 5,
c h a r a c t e r i s e d   in that said information
concerning visual properties is used for specifying a
layer in which a graphical input is deposited.

17. A drawing device for inputting graphical infor-
25   mation into a computer system, the graphical information
arising when the drawing device is moved relative to a
base, c h a r a c t e r i s e d   in that the drawing de-
vice is arranged to detect positions on said base by
means of a position-coding pattern marked on the base;
30   and in that a computer system integrated in the drawing
device is arranged to detect positions within a first
area on the base as graphical inputs and positions within
a second area on the base as information concerning
visual properties associated with a graphical input.

35   18. A drawing device as claimed in claim 15,
c h a r a c t e r i s e d in means for allotting a detected
position a time-stamp.

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19. A storage medium for digital information, which
can be read by a computer system, the storage medium con-
taining a program for inputting graphical information
into a computer system, c h a r a c t e r i s e d in that
5   said program defines the following steps:
        - recording of position information from a drawing
device indicating positions within a first area on a base
as graphical inputs, and
        - recording of position information from a drawing
10   device indicating positions within a second area on said
base as information concerning visual properties as-
sociated with said graphical inputs.

        20. A base for inputting information into a computer
system, c h a r a c t e r i s e d in that the base (3) is
15   provided with a position-coding pattern (7) which makes
it possible to detect positions on the base (3) using a
drawing device, which is arranged to transmit position
information to a computer system; in that the base (3)
has an area (13), and in that a sub-area (21) within said
20   area (13), where positions within the sub-area (21) are
intended to be detected by the computer system as
specific information, is provided with a visual indicator
(22) representing this information, wherein said area
comprises a set of sub-areas, each provided with at least
25   one alphanumeric symbol.

        21. A base according to claim 20, in which said sub-
areas are visually separated.

        22. A base as claimed in claim 20 or 21, wherein
said specific information is an ASCII-code corresponding
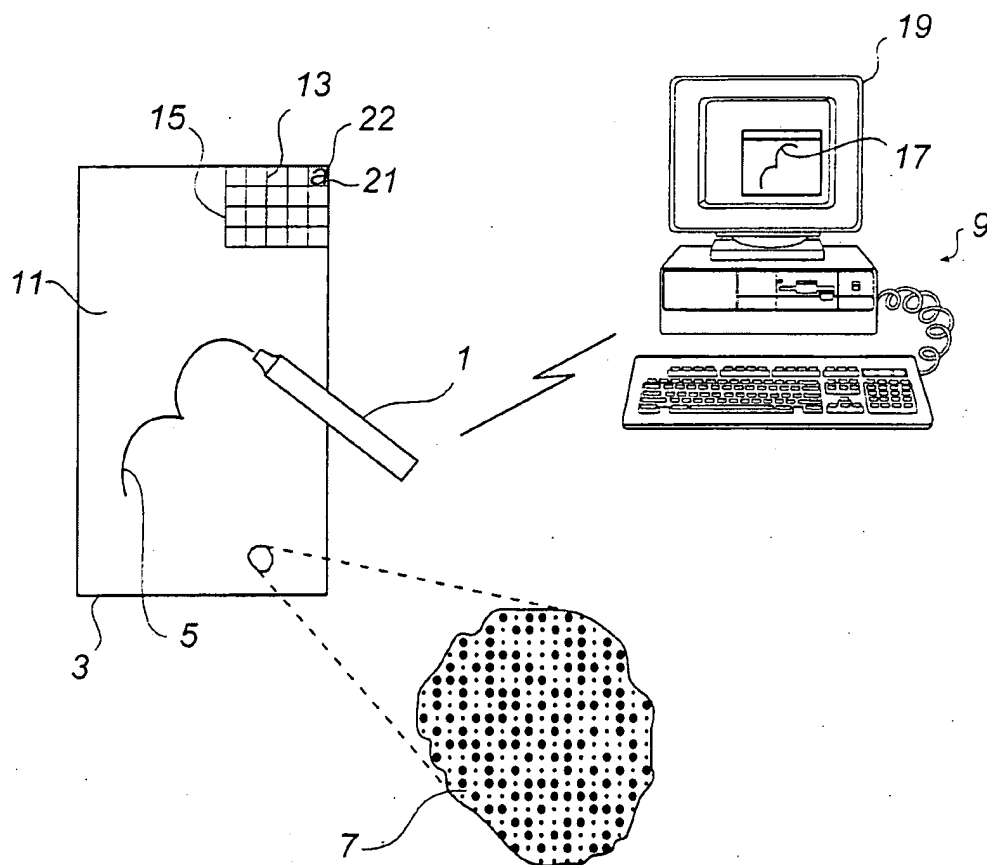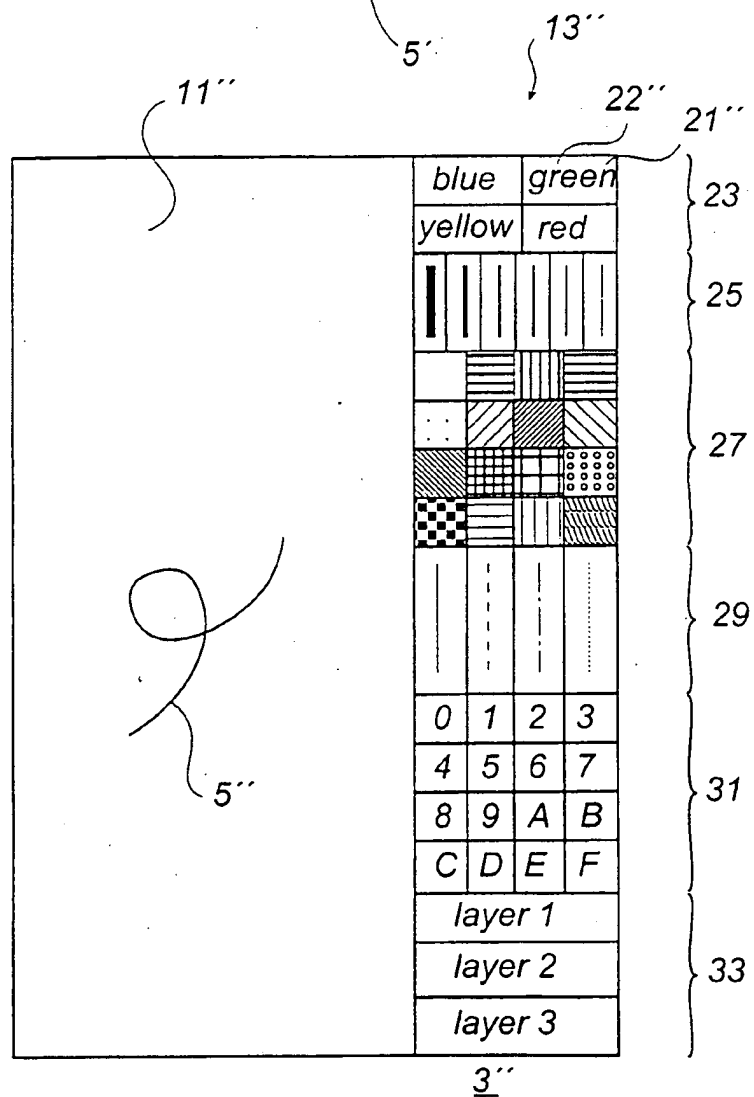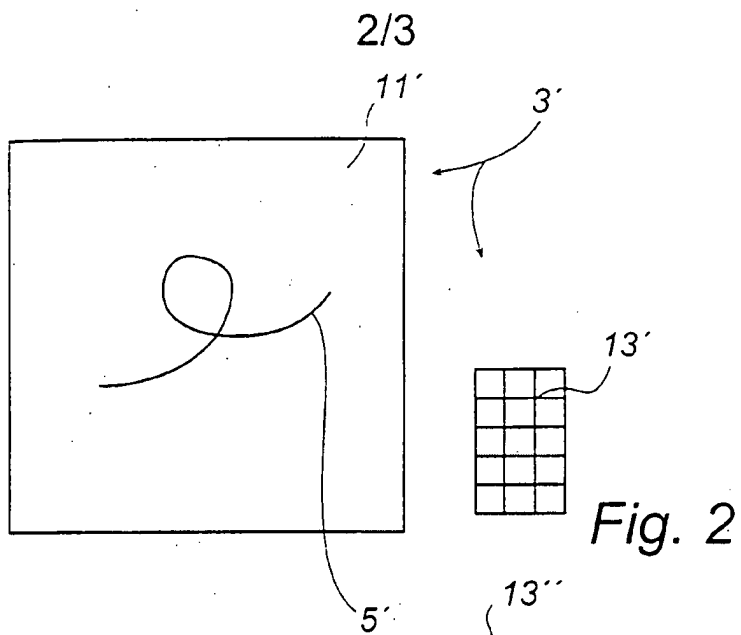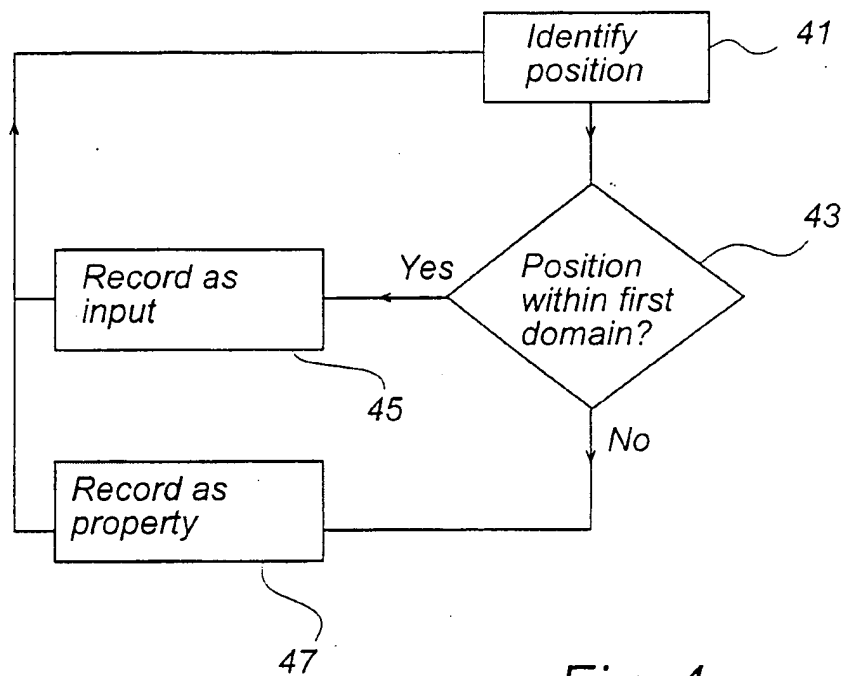30   to said visual indicator.

Fig. 1

Fig. 2

Fig. 3

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Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 01/00585

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 3/033, G06K 11/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F, G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI-DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5852434 A (SEKENDUR), 22 December 1998 (22.12.98), column 1, line 8 - column 4, line 24, figure 7, abstract	1-22
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
28 May 2001	18 -06- 2001
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Authorized officer Per Heimdal /OGU Telephone No. + 46 8 782 25 00

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